

1. Supporting documents



The following documents are available for download on our website. Only the documents currently available on the website are valid.

- Catalogue
- Drawings, performance data, information about accessory parts etc.
- General terms and conditions of business
Includes warranty information, among other things

2. Proper use



The swivel unit should only be used in its original state with its original accessories, with no unauthorised changes and within the scope of its defined parameters for use. Zimmer GmbH accepts no liability for any damage caused by improper use.

The swivel unit is designed for operation with compressed air only. It is not suited for operation with other media such as liquids or other gases. The swivel unit is properly used in closed rooms to swivel permitted mounting parts or workpieces. It is not suitable for swivelling workpieces during a machining process or for direct contact with perishable goods.

3. Function

An alternating ventilation sets the two internal pneumatic pistons in motion. The energy generated in this process is transferred via the piston shaped as a toothed rod to the drive flange's toothed wheel, and results in the torque.

4. Personnel qualifications

Installation, commissioning and maintenance may only be undertaken by trained persons. These persons must have read and understood the installation and operating instructions in full.

5. Assembly

5.1 Information about possible dangers when installing the swivel unit

**CAUTION! Non-compliance may result in minor injuries**

When transporting the unit to its destination, observe the local health and safety regulations for lifting and carrying heavy loads.

**WARNING! Non-compliance may result in death or serious injuries**

With an overhead assembly of a swivel unit weighing over 3 kg, you must work with lifting equipment or with two persons.

5.2 Installing the swivel unit

The swivel unit can be fitted from several sides on a mounting surface with the necessary evenness. If the mounting surface is <100 mm, the permitted unevenness is <0.02 mm; if the length is >100 mm, the permitted unevenness is <0.05 mm.

The following steps should be performed to install the swivel unit:

- If using the connection without a hose, fit O-rings in the recesses on the mounting surface (made by the customer)
- Insert cylinder pins or centring sleeves (depending on type) in the fits provided on the swivel unit
- Position the swivel unit on the mounting surface using the cylinder pins or centring sleeve (depending on type)
- Secure swivel unit with strength class 8.8 socket head cap screws

5.3 Information about possible dangers when installing the custom application

**WARNING! Non-compliance may result in death or serious injuries**

Before the assembly of permitted mounted parts and workpieces, depressurise the system and remove the supply lines on the swivel unit.

5.4 Installing the custom application

Before installing the custom application, make sure its weight is appropriate for the selected swivel unit.

The following steps should be performed to install the custom application:

- If using the connection without a hose, fit O-rings in the recesses on the drive flange
- Insert cylinder pins in the intended fits on the drive flange
- Position the custom application with a cylinder pin on the drive flange
- Secure the custom application with strength class 8.8 socket head cap screws

6. Commissioning

6.1 Information about possible dangers when commissioning



The swivel unit may only be used as intended and in accordance with the technical data. Observe the safety regulations valid at the place of installation. When operating without the provided or corresponding one-way restrictors, the warranty is voided. The integrated shock absorbers may not be used as a fixed stop. Zimmer GmbH accepts no liability for any damage resulting from non-compliance with these installation and operating instructions.

**WARNING! Non-compliance may result in death or serious injuries**

Before operating the swivel unit, make sure no part of the body is in the range of travel of the swivel unit. In an EMERGENCY STOP, the swivel unit can still move.

6.2 Setting the swivel angle in units limited to 90° or 180°

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle of $\pm 3^\circ$ per limit stop. With heavy attachment loads, it is recommended to use the external limit stops. To adjust the limit stops, the locknut is loosened and the corresponding setting screw is positioned while the swivel unit is decompressed. Always ensure that the setting screws make contact with the respective limit stop surfaces.

6.3 Setting the swivel angle in 180° freely adjustable units

6.3.1 Size MSF34 / MSF40 / MSF44

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle from -3° to $\pm 93^\circ$ per limit stop. To adjust the limit stops, the locknut is loosened and the corresponding setting screw is positioned while the swivel unit is depressurised. Always ensure that the setting screws make contact with the respective limit stop surfaces.

6.3.2 Size SF50 / SF74 / SF100

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle from -3° to $\pm 183^\circ$ per limit stop. To adjust the limit stops, the locknut is loosened and the corresponding setting screw is positioned while the swivel unit is depressurised. Always ensure that the setting screws make contact with the respective limit stop surfaces.

6.3.3 Size SF125 / SF155 / SF195

The internal limit stops for this unit are in the version of a sleeve with an integrated shock absorber. They enable adjustment of the swivel angle from -3° to 183° per limit stop. To adjust the limit stops, the locknut is loosened and the corresponding setting sleeve is positioned while the swivel unit is decompressed. Always ensure that the setting screws make contact with the respective limit stop surfaces, so that the shock absorber does not serve as an end limit stop.

6.4 Setting the end position cushioning

The following steps should be carried out to adjust the end position cushioning:

- Loosen the shock absorber locknut and turn the shock absorber clockwise until the drive flange moves
- Unscrew the shock absorber by 3-4 turns counter-clockwise (decreases shock absorption)
- Loosely attach locknut
- Remove persons, all tools and other objects from the swivel unit's swivel range
- Attach swivel unit to the energy supply and fill with correspondingly prepared air
- Open the setting screws of the one-way restrictor by a few turns
- Alternating sides, pressurise the swivel unit with compressed air
- Check settings
- If necessary, make adjustments using the setting screws of the one-way restrictors and by adjusting the shock absorber
- Clamp the shock absorber locknut

An ideal setting is reached if a uniform swivel movement and an approach to the limit stops with exhaust air throttling is guaranteed.

7. Middle position version ML

7.1 Function

The swivelling is identical to the description listed under item 3.

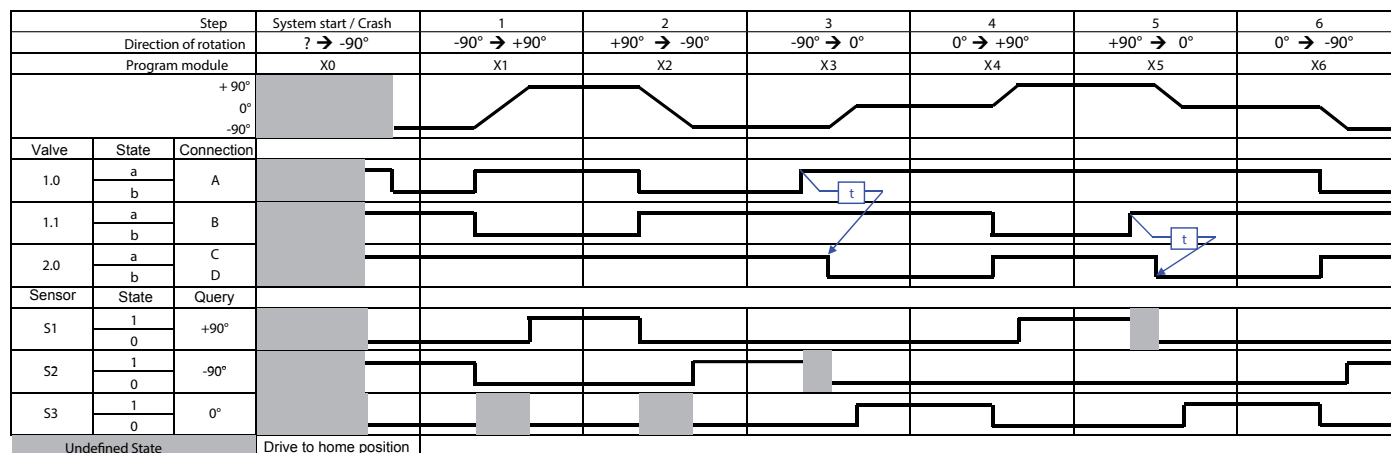
With this version, the driven pistons of the swivel movement move against a dominant limit piston and are shock absorbed in the end position of the middle position. Depending on design, with this unlocked middle position, the middle position can be overshoot.

7.2 Control

7.2.1 Query via 3 inductive sensors



The function diagram describes the process and the query of the individual positions and piston settings. The program modules listed are saved on the data storage device contained in the scope of delivery. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.



t = 0,2 s (depending on line diameter and line length)

? = Unit is undefined before the start

■ = Undefined state

7.2.2 Query via 4 magnetic field sensors



The function diagram describes the process and the query of the individual positions and piston settings. The program modules listed are saved on the data storage device contained in the scope of delivery. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

Step			System start / crash	X1	X2	X3	X4	X5	X6
Direction of rotation			? → -90°	-90° → +90°	+90° → -90°	-90° → 0°	0° → +90°	+90° → 0°	0° → -90°
Program module			X0	X1	X2	X3	X4	X5	X6
			+ 90°						
			0°						
			-90°						
Ventil	State	Connection							
1.0	a	A							
	b								
1.1	a	B							
	b								
2.0	a	C							
	b								
Sensor	State	Query							
S1	1	+90°							
	0								
S2	1	-90°							
	0								
S3	1	0°							
	0								
S4	1	ASK ausg.*							
	0								
Undefined State			Drive to home position						

t = 0,2 s (depending on line cross-section and line length)

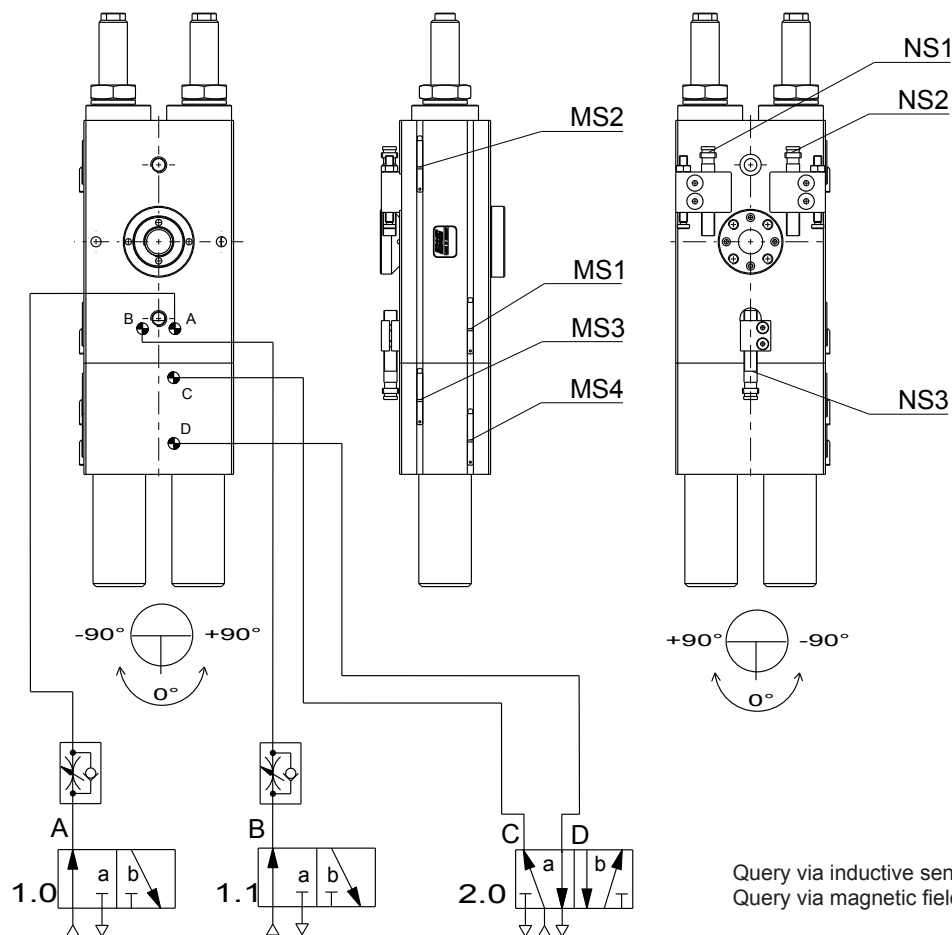
? = Unit is undefined before the start

LSP extd. = Limit stop pistons extended

LSP retr. = Limit stop pistons retracted

■ = Undefined state

7.2.3 Circuit diagram



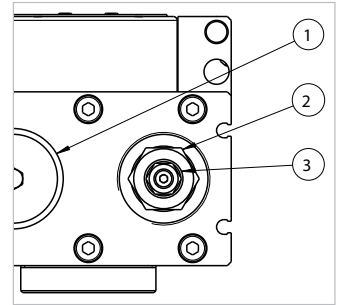
7.3 Setting the middle position



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the absorber does not serve as an end limit stop.

The following steps should be carried out to set the limit stop:

- Depressurise the unit
- Remove protective sleeve ①
- Loosen locknut ②
- Adjust the limit stop via setting screw ③ in the range of $\pm 3^\circ$
- Tighten locknut ② while simultaneously counterholding setting screw ③
- Repeat procedure for the second limit stop
- Remove persons, tools and other objects from the swivel unit's danger zone
- Pressurise unit and carry out a function check



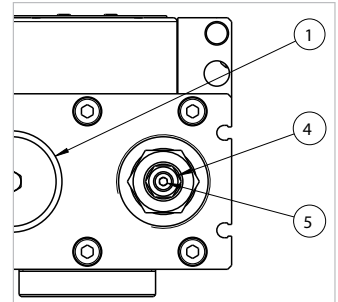
7.4 Setting the end position cushioning of the middle position



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the absorber does not serve as an end limit stop.

Carry out the following steps to adjust the end position cushioning:

- Depressurise the unit
- Remove protective sleeve ①
- Loosen locknut ②
- Screw in (shock absorption increases) or unscrew setting screw ⑤ (Shock absorption decreases) in order to adapt the shock absorber to the object to be swivelled
- Locknut ④ with simultaneous counterholding of the setting screw ⑤ tighten
- Repeat procedure for the second limit stop
- Remove persons, tools and other objects from the swivel unit's danger zone.
- Remove the swivel unit, ventilate the unit and carry out a function check

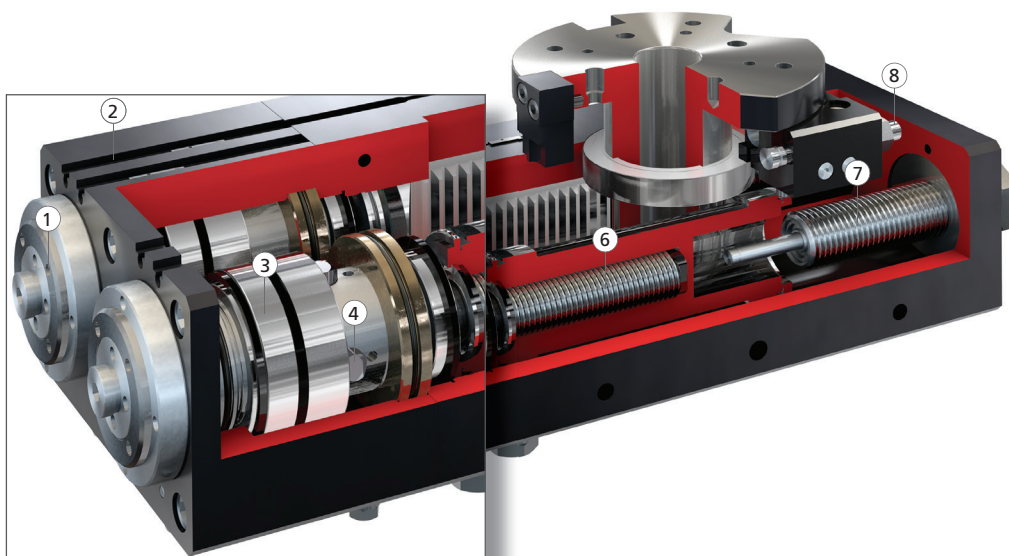


8. Middle position version M

8.1 Function

The swivelling is identical to the description listed under item 3. This version has a mechanical and shock-absorbed fixed limit stop in each position. The middle position is realised by means of two stopper pistons. With locking bolts which are put into the ring nut of the stopper piston by the locking pistons, the mechanical fixed limit stop is generated in the middle setting position.

8.1.1 Schematic



- ① Setting position and damping of the middle position
- ② Magnetic field sensor query of the middle position
- ③ Locking pistons
- ④ Locking bolts
- ⑥ Shock absorber for middle position
- ⑦ Shock absorber for the end position
- ⑧ Setting end limit stop

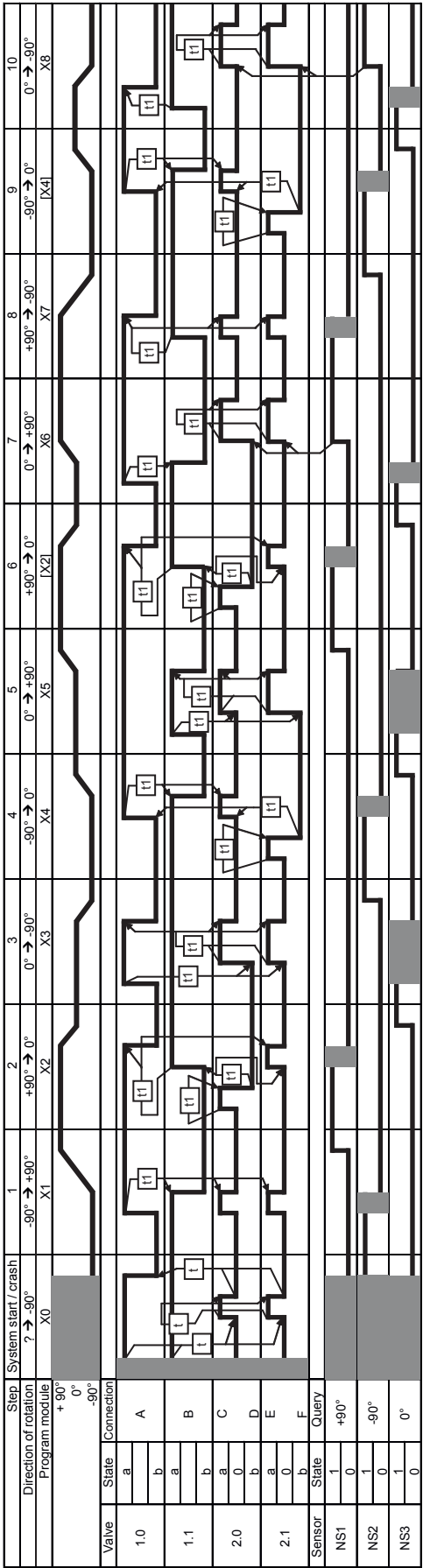
8.2 Control

8.2.1 Query via 3 inductive sensors



When programming a step in the function diagram, you must pay attention that this is always in relation to the previously defined step. Example: Step 3 and step 10 describe the same travel path, but are different from the activation. Steps 5 and 7 behave likewise. The reason for the different activation is the previous step. While in steps 3 and 5 the swivel unit swivels over the 0° position, with steps 7 and 10, it is then swung back from the 0° position. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.



The times given have been empirically determined at 6 bar operating pressure, a line length of 3 m and with a line diameter of 8 mm. Changes in operating conditions result in changes to these times.

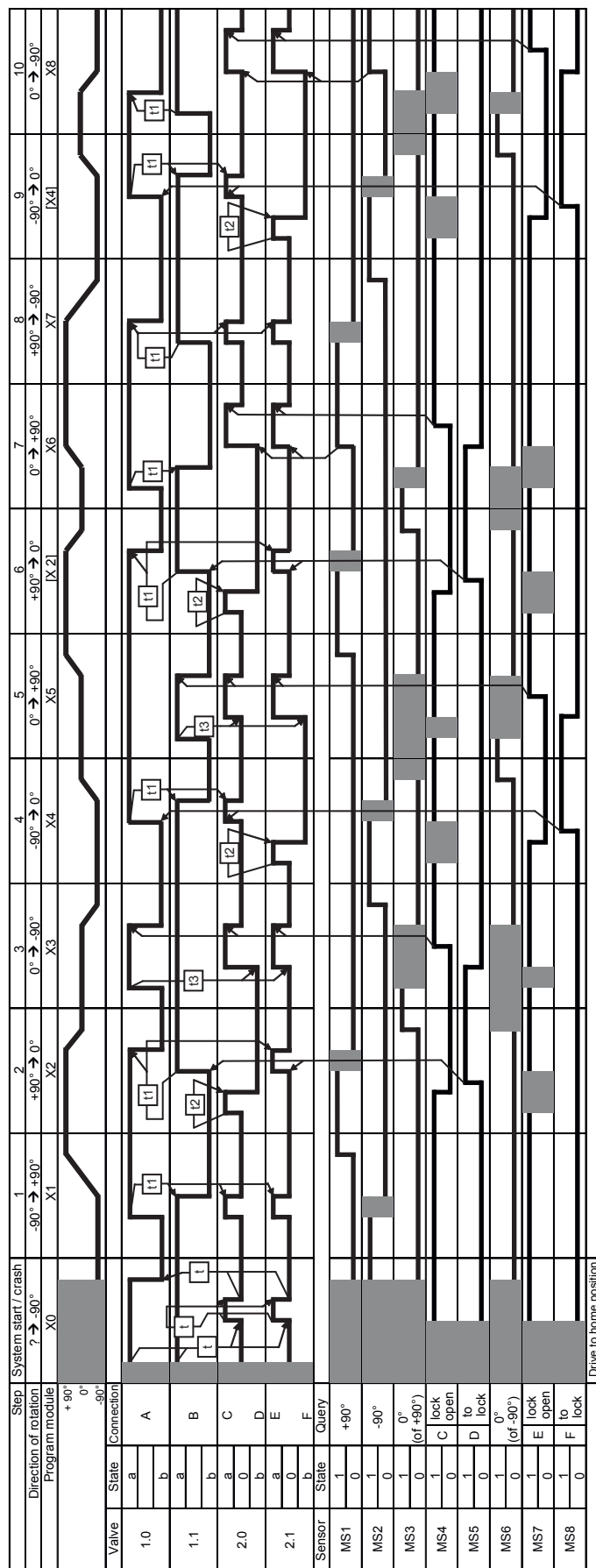
- t = 0.4 s (without sensor query of the position travelled to)
- t1 = 0.2 s
- ? = Unit is undefined before the start
- = Undefined state

8.2.2 Query via 8 magnetic field sensors



When programming a step in the function diagram, you must pay attention that this is always in relation to the previously defined step. Example: Step 3 and step 10 describe the same travel path, but are different from the activation. Steps 5 and 7 behave likewise. The reason for the different activation is the previous step. While in steps 3 and 5 the swivel unit swivels over the 0° position, with steps 7 and 10, it is then swung back from the 0° position. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.



The times given have been empirically determined at 6 bar operating pressure, a line length of 3 m and with a line diameter of 8 mm. Changes in operating conditions result in changes to these times.

t = 0.4s (without sensor query of the position travelled to)

t1 = 0.03s

t2 = 0.06s

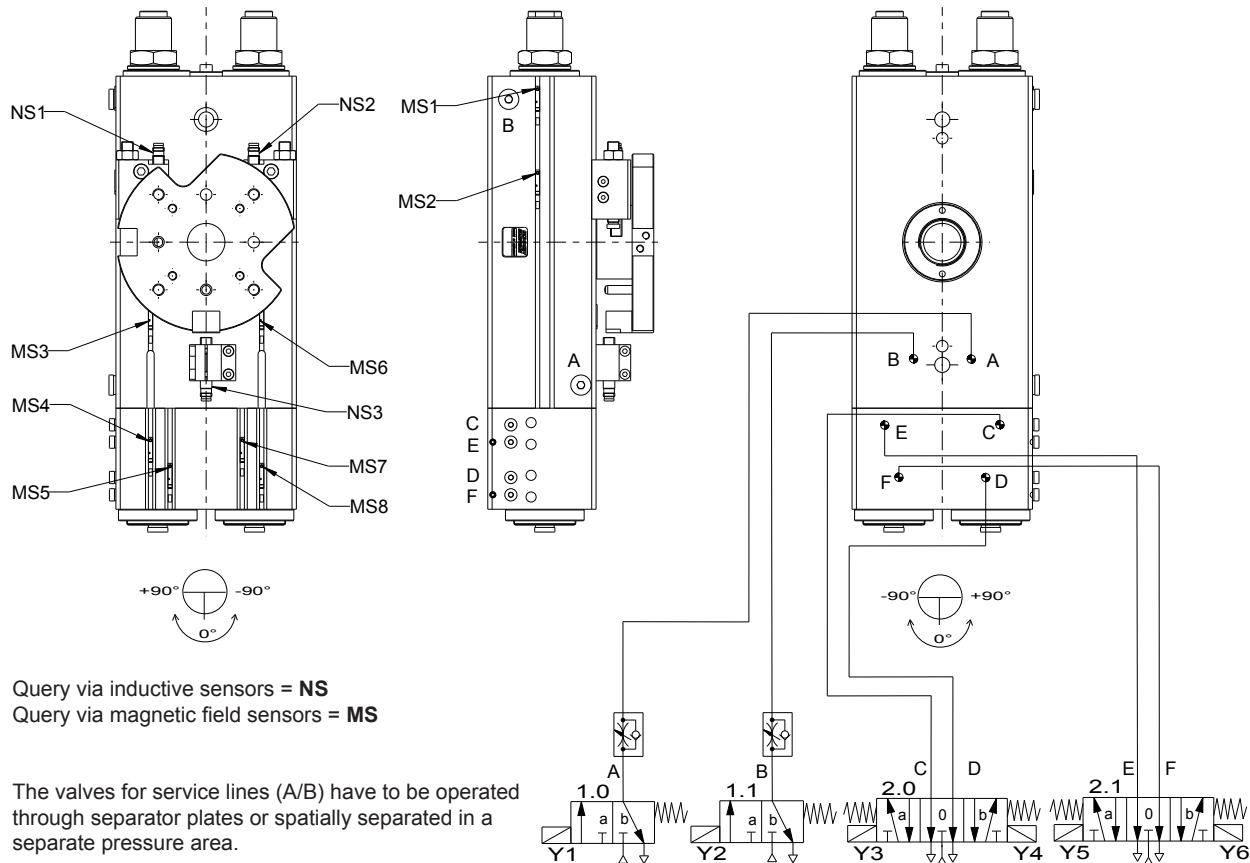
t3 = 0.25s

? = Unit is undefined before the start

Verr. = Locking mechanism

= Undefined state

8.2.3 Circuit



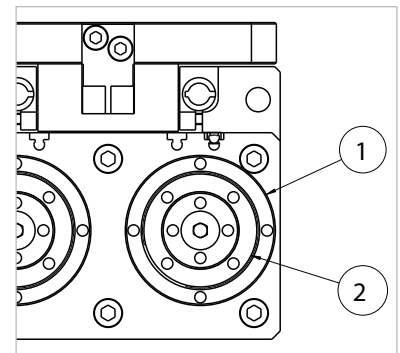
8.3 Setting the middle position



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the absorber does not serve as an end limit stop.

Carry out the following steps to adjust the end position cushioning:

- Remove persons, tools and other objects from the swivel unit's danger zone
- Ventilate the unit
- Move out the stopper piston to be set and lock it
- Depressurise the unit
- Loosen clamping ring ① with a pin wrench
- Adjust the limit stop via setting ring ② in the range of $\pm 3^\circ$.
- Tighten clamping ring ① while simultaneously counterholding clamping ring ②
- Repeat procedure for the second limit stop
- Remove persons, tools and other objects from the swivel unit's danger zone
- Ventilate unit and carry out a function check



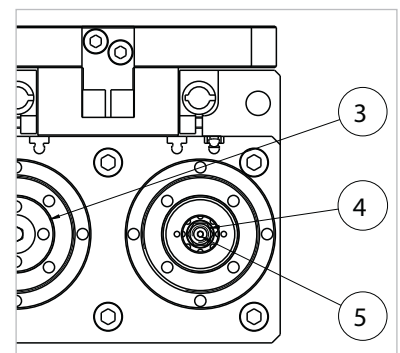
8.4 Setting the end position cushioning of the middle position



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the absorber does not serve as an end limit stop.

Carry out the following steps to adjust the end position cushioning:

- Remove end cover ③ with a pin wrench
- Loosen locknut ④
- Screw in (shock absorption increases) or unscrew setting screw ⑤ (Shock absorption decreases) in order to adapt the shock absorber to the ③ object to be swivelled
- Tighten locknut ④ while simultaneously counterholding setting screw ⑤
- Repeat procedure for the second limit stop
- Remove persons, tools and other objects from the swivel unit's danger zone
- Pressurise unit and carry out a function check



9. Maintenance

9.1 Information about possible dangers when maintaining the unit

**CAUTION! Non-compliance may result in minor injuries**

When transporting the unit to its destination, observe the local health and safety regulations for lifting and carrying heavy loads.

9.2 Maintenance intervals

Maintenance-free operation of the swivel unit is guaranteed for up to 10 million cycles.

The maintenance interval may shorten under the following circumstances:

- Operation with compressed air that does not comply with DIN ISO 8573-1 quality class 4
- Dirty environment
- Improper use and use that does not comply with the performance data
- Ambient temperature of more than 60°C; lubricants harden faster!

During all maintenance, the swivel unit should be lubricated with the following lubricants or those which have been proven to display the same characteristics:

- Mechanical parts: Molykote BR2plus
- Cylinder: Renolit HLT2

9.3 Disassembly of the swivel unit

We recommend using the Zimmer GmbH repair service for maintenance and the replacement of seals. Dismantling and reassembling the swivel unit yourself may result in complications as in some cases special installation equipment is required.

10. Remedy

Problem	Possible causes	Remedy
Swivel unit does not move	Pressure is below the minimum threshold	Increase the operating pressure
	Throttles closed (factory condition)	Turn throttles slowly until the desired swivel time is reached
	Hoses are faulty	Check compressed air hoses and connections
	Unnecessary air connections are open	Close the air connections properly
	Sensors are defective or set wrong	Check sensors and wiring and replace if necessary
	The weight of the attachments or the workpieces is too high	Bring weight into conformity with the swivel unit's technical data
	Damage to one or more functional parts due to overload	Disassemble the swivel unit, replace the damaged parts, relubricate and replace the seals
Swivel unit moves in a jerky manner	Pressure is below the minimum	Increase the operating pressure
	Operating pressure is too restricted	Slowly open the throttles until the desired speed is reached
	The weight of the attachments or the workpieces is too high	Bring weight into conformity with the swivel unit's technical data
End positions are not reached	Operating pressure is too low	Increase the operating pressure
	The shock absorbers are functioning as the end limit stop	Unscrew the shock absorber, reset it, and check its damping behaviour
	There is contamination between the limit stop screw and the limit	Clean the swivel unit
The limit stops are hit too hard	The end position shock absorption settings are faulty	Unscrew the shock absorber, reset it, and check its damping behaviour
The torque is not reached	Pressure is below the minimum threshold	Increase the operating pressure
	Seals are overflowing	Dismantle the unit, replace the seals and relubricate
	There is too much lubricant on moving	Dismantle the unit, clean it, relubricate it and replace the seals
Middle position is not reached	Programming error	Adjust the control system according to the control system
	Hoses are faulty	Check compressed air hoses and connections
	Pressure is below the minimum threshold	Increase the operating pressure
	The weight of the attachments or the workpieces is too high	Bring weight into conformity with the swivel unit's technical data
	Damage to one or more functional parts due to overload	Disassemble the swivel unit, replace the damaged parts, relubricate and replace the seals
In M version, the middle position is run over	Leakage of the valve terminal	The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.

11. Accessories / scope of delivery



If any accessories not sold or authorised by Zimmer GmbH are used, the function of the swivel unit cannot be guaranteed. Zimmer GmbH's range of accessories is specially tailored to the individual swivel units.

Corresponding optional accessories and those included in the scope of delivery can be found at www.zimmer-group.de.

12. Sensors

12.1 Notes on using the sensors



The listed sensors sold or recommended as accessories by Zimmer GmbH for the swivel unit in question should be used to ensure reliable sensing. Zimmer GmbH does not guarantee correct function if third party products are used. If the sensors are exposed to an additional external magnetic field - as produced by servo motors, for example - this may affect the switching points.

Sensors with cast-on cables sold by Zimmer GmbH are all suited to drag chains. The minimum permissible laying radius is 5 times the cable diameter. For rigid laying, this radius is reduced to 3 times the cable diameter.

12.3 Adjusting the magnetic field sensors

12.2.1 General

The following steps should be performed to install and commission the magnetic field sensors:

- Move the depressurised swivel unit to one of the end positions
- Supply the magnetic field sensor with current, place it in the groove on the swivel unit, push it to the first switching point (LED in) and mark the point.
- Push the magnetic field sensor further, to the switch-off point (LED off); push it back again until the second switching point (LED on) is reached, and mark this point
- The optimum magnetic field sensor position is between the two switching points
- Note the maximum tightening torque of the fastening screw(s); see the information included with magnetic field sensor
- The process has to be repeated for the additional end positions

12.2.2 Middle position version M



When installing the magnetic field sensors with a conventional Allen key, there is a shift in the magnetic field due to the material properties of the key, and there will a switching point will also be shifted. To check the signal, remove the Allen key.

A shift in the magnetic field can also happen due to accessories with ferritic properties, which makes a readjustment of the magnetic field sensors necessary.

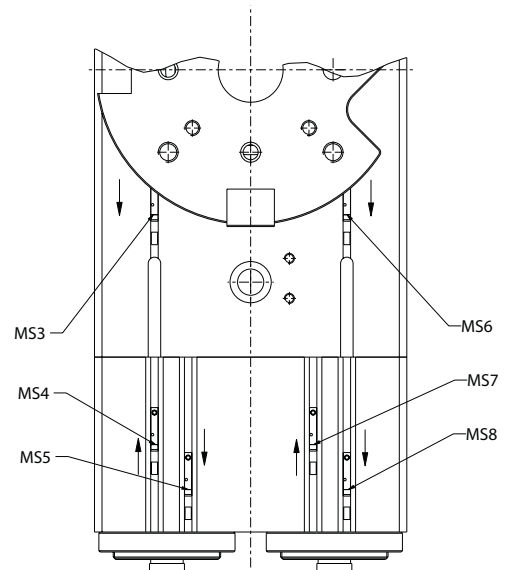


WARNING! Non-compliance may result in death or serious injuries

Before operating the swivel unit, make sure no part of the body is in the range of travel of the swivel unit. In an EMERGENCY STOP, the swivel unit can still move.

The following steps should be performed to install and commission the magnetic field sensors:

- End positions -90° and $+90^\circ$, sensors MS1 and MS2
- Proceed as described in 12.2.1
- Sensor MS3, stopper piston locked and swivel movement piston started up, approaching the 0° position from the $+90^\circ$ position
 - Move to step 2 of function diagram 8.2.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor opposite, about 1mm past the first switching point (LED on), and secure it
- Sensor MS4, stopper piston locked, approaching 0° position from the $+90^\circ$ position
 - Move to step 2 of function diagram 8.2.2
 - Insert magnetic field sensor and push it in the direction of the rotational axis to the first switching point (LED on) and secure it
- Sensor MS5, stopper piston unlocked, approaching $+90^\circ$ position from the 0° position
 - Move to step 7 of function diagram 8.2.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor opposite until the first switching point (LED on) and secure it
- Sensor MS6, stopper piston locked and swivel movement piston started up, approaching the 0° position from the -90° position
 - Move to step 4 of function diagram 8.2.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor opposite, about 1mm past the first switching point (LED on), and secure it
- Sensor MS7, stopper piston locked, approaching the 0° position from the $+90^\circ$ position
 - Move to step 4 of function diagram 8.2.2
 - Insert the magnetic field sensor and push it in the direction of the rotational axis to the first switching point (LED on) and secure it
- Sensor MS8, stopper piston unlocked, approaching the -90° position from the 0° position
 - Move to step 7 of function diagram 8.2.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor opposite until the first switching point (LED on) and secure it



12.3 Adjusting the inductive sensors



A requirement for using inductive sensors is that external limit stops and clamping blocks for the sensor support are attached. These components are components of the accessory kit and are not included in the scope of delivery of the unit.

The following steps should be performed to install and commission the inductive sensors:

- Move the depressurised swivel unit to one of the end positions
- Push the inductive sensor into the external limit stop or clamping block
- Adjust and clamp the inductive sensor with regard to its secured switching distance to the limit stop surface
- The process has to be repeated for the additional end positions

13. Declaration of incorporation in terms of the EC Directive 2006/42/EC on Machinery (Annex II 1 B)

Name and address of the manufacturer:

Zimmer GmbH
Im Salmenkopf 5
D-77866 Rheinau

We hereby declare that the incomplete machines described below

Product designation: Pneumatic swivel unit

Type designation:

SF50N-C	SF100-90D4-C	SF155-180D4-C	MSF34S-F001
SF50-90N-C	SF100-180D4-C	SF155MD4-C	MSF34N-F002
SF50-180N-C	SF100MLD4-C	SF155D8-C	MSF34S-F002
SF50ML-C	SF100D6-C	SF155-90D8-C	MSF34N-D2
SF50D4-C	SF100-90D6-C	SF155-180D8-C	MSF34S-D2
SF50-90D4-C	SF100-180D6-C	SF155MD8-C	MSF40N-F001
SF50-180D4-C	SF100MLD6-C	SF195N-C	MSF40S-F001
SF50MLD4-C	SF125N-C	SF195-90N-C	MSF40N-F002
SF74N-C	SF125-90N-C	SF195-180N-C	MSF40S-F002
SF74-90N-C	SF125-180N-C	SF195M-C	MSF40N-D2
SF74-180N-C	SF125M-C	SF195D4-C	MSF40S-D2
SF74ML-C	SF125D4-C	SF195-90D4-C	MSF44N-F001
SF74D4-C	SF125-90D4-C	SF195-180D4-C	MSF44S-F001
SF74-90D4-C	SF125-180D4-C	SF195MD4-C	MSF44N-F002
SF74-180D4-C	SF125MD4-C	SF195D8-C	MSF44S-F002
SF74MLD4-C	SF125D8-C	SF195-90D8-C	MSF44N-D2
SF74D6-C	SF125-90D8-C	SF195-180D8-C	MSF44S-D2
SF74-90D6-C	SF125-180D8-C	SF195MD8-C	
SF74-180D6-C	SF125MD8-C	SW50D4-C	
SF74MLD6-C	SF155N-C	SW74D4-C	
SF100N-C	SF155-90N-C	SW100D4-C	
SF100-90N-C	SF155-180N-C	SW125D4-C	
SF100-180N-C	SF155M-C	SW155D4-C	
SF100ML-C	SF155D4-C	SW195D8-C	
SF100D4-C	SF155-90D4-C	MSF34N-F001	

satisfy the following basic requirements of the Machinery Directive 2006/42/EC

Nr.1.1.2., Nr.1.1.3., Nr.1.1.5., Nr.1.3.2., Nr.1.3.4., Nr.1.3.7., Nr.1.5.3., Nr.1.5.4., Nr.1.5.8., Nr.1.6.4., Nr.1.7.1., Nr.1.7.4.

We also declare that the specific technical documents were produced in accordance with Annex VII Part B of this Directive.

We undertake to provide the market supervisory bodies with electronic versions of the incomplete machine's special documents via our documentation department should they have reason to request them.

The incomplete machine may only be commissioned if it has been ascertained, if applicable, that the machine or system in which the incomplete machine is to be installed satisfies the requirements of Directive 2006/42/EC on Machinery and an EC declaration of conformity has been drawn up in accordance with Annex II 1 A.

Authorised representative for compiling the relevant technical documents

Kurt Ross	See manufacturer's address
First name, last	Address

Rheinau, 13. February 2014	Martin Zimmer
(Place and date)	(legally binding signature)
	Managing Director